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WINTER HAVEN, FLORIDA—These citrus men will help serve the industry in the planning of the 1959 Florida Citrus Exposition to be held in Winter Haven, Florida, March 7 to 14. Standing, from left, are John A. Snively, Jr., of Winter Haven, Jack M. Berry, of Winter Haven, George Fullerton, of Oak Hill, Robert Sorrells, of Arcadia, King Kendrick, of Dade City, and Harry DiCristina, of Davenport. Seated, from the left, are Andrew Spada, Jr., of Tampa, Henry Craig, of Orlando, directors of the 1958-59 Citrus Exposition, Ben Hill Griffin, Jr., of Frostproof, president of the industry show, and Doyle Carlton, Jr., of Wauchula, also director.

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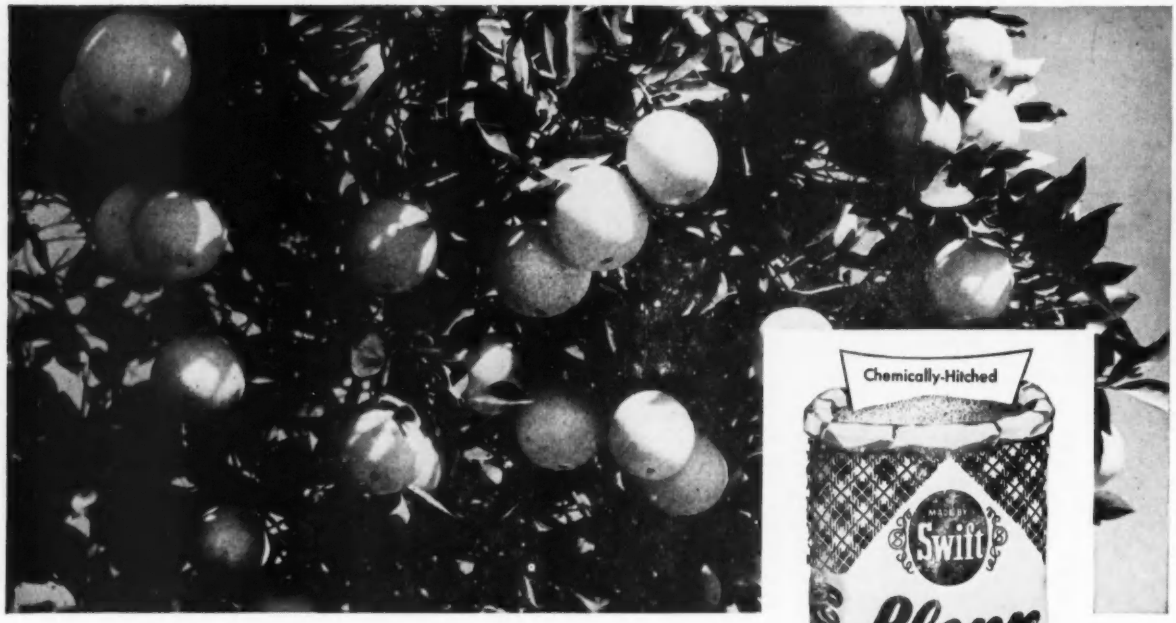

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W. L. Thompson

Citrus Insect Control

W. A. Simanton

For January 1959

W. L. THOMPSON
W. A. SIMANTON
R. B. JOHNSON*
Florida Citrus Experiment Station, Lake Alfred

R. B. Johnson

Contrary to December trends of the past seven years, red scale continued to increase after reaching a high November level. Infestations are now at the highest December level since the survey was started in 1951. This trend is expected to continue into January and, barring a severe cold spell, means that heavy populations will be present during most of the winter. Some groves had infestations that required two fall scalicide sprays this year while other groves in the same general area have been relatively free of red scale.

Purple scale followed a more normal pattern and was not especially troublesome during December. Slightly heavier infestations are predicted for January. The Ridge and Upper East Coast areas will bear watching.

Rust mite and purple mite infestations were below average in November, then increased steadily during December. Rust mite has not been a general problem over the State since summer, and populations are at moderate levels at present. The fact that rust mite activity is still rather high, especially on leaves, indicates a further buildup with the probability of damaging populations persisting into February. Purple mite populations have come up steadily from a record low point in September to an above average level for December. Present high activity points to above normal levels through January. As long as mild and humid weather prevails, damage from moderate populations of mites may not be noticed, but should cold dry winds occur, as is likely during winter, mesophyll collapse and firing can be severe where mites are present.

Six spotted mites are not expected to be a problem in January or through the spring since high populations do not follow warm December weather.

* Written December 23, 1958. Reports of surveys by Harold Holtsberg, Fort Pierce; J. W. Davis, Tavares; K. G. Townsend, Tampa; T. B. Hallam, Avon Park; and L. M. Sutton, Lake Alfred.

SPRAY PROGRAM

January is the time to formulate the basic plans for the 1959 spray schedule, especially for the first three to four months. Groves should be checked for all major insects and mites to determine whether treatment is necessary before the post-bloom spray. Only emergency sprays should be applied when the growth is very tender because the force of the spray alone will injure it.

Scale Control: Where red scale is present in any amount, it should be controlled before the new growth comes out because crawlers will settle on succulent growth and distort it before it is time for the post-bloom spray. And if for some reason the post-bloom spray is delayed until the fruit is one half inch in diameter or larger, the scale will infest it and cause it to be a coarse fruit when it matures.

There is a carry over of purple scale in some groves so where a medium to heavy infestation exists treatment should be made to check fruit drop and prevent development of dead wood. However, if the infestation is not too severe, a better clean-up can be accomplished with the post-bloom spray because a high percentage of scales are then in the young stages and most groves are free of mature fruit.

In the Indian River area from Sebastian south, a dormant scalicide is very effective and is recommended where it fits in the spray program.

Either .25 pound (technical) parathion or 1 to 1.25 pounds of malathion (technical) per 100 gallons is recommended for scale control. An oil spray is effective but it may cause a heavy leaf drop if cold weather develops after the application. An oil spray on Valencias will also retard degreening in the spring. If oil is used delay the application until just before growth starts or at the pin point stage of growth when there will be less danger of cold weather occurring. There is a waiting period of 14 days with parathion and 7 days with malathion between spraying and harvest.

Mealybug Control: Check for mealybugs on tree trunks, large limbs, and around the stem-end of fruit, especially late bloom fruit. An application of either parathion or malathion should reduce the population to a low level so that there will be no problem in the spring.

Purple Mite and Texas Citrus Mite: During the winter months the two species of mites can cause severe leaf drop, especially during periods of dry, windy weather A dry, cold wind alone can cause mesophyll collapse, but if mites are present the injury will be more severe. When checking for these mites inspect tree tops if no mites are found on the lower portion of trees, because in

(Continued on page 19)

SCALE AND MITE ACTIVITY BY DISTRICTS *

District	Purple Scale	Red Scale	Purple Mite	Rust Mite on leaves	Rust Mite on fruit
West Coast	2.51	3.12	1.40	2.44	2.55
Indian River	2.88	3.93	1.06	1.93	1.70
Upper East Coast	3.57	.71	2.42	1.71	1.50
Gainesville	2.75	4.34	1.16	1.00	1.00
Orlando	2.00	2.62	1.45	.89	.80
Brooksville	2.80	.83	1.27	1.27	1.44
Ridge	4.91	4.76	2.13	2.91	2.68
Bartow	2.93	3.40	1.22	3.13	3.01
State Average	3.22	3.81	1.55	1.95	1.62
Last Year	3.38	2.67	.99	2.19	1.86

* Third week in December. Activity is computed from populations, amount of hatching of scales, and number of groves with increasing or decreasing infestations. Activity is considered high if above 4.0 for purple scale, 3.0 for red scale, and 1.5 for mites.


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Soil Application Of Zinc For Citrus On Acid Sandy Soil[1]

C. D. Leonard, Ivan Stewart and George Edwards
Florida Citrus Experiment Station, Lake Alfred
Presented at Florida State Horticultural Society Meeting in October

Zinc is applied to most Florida citrus groves as a nutritional spray. Although zinc foliage sprays will control zinc deficiency (frenching) in citrus it has been shown that this element does not translocate from the sprayed leaves to the new growth (12). Hence growers usually apply a zinc spray each year to prevent the deficiency. Foliage sprays leave a residue on the leaves which tends to increase the scale population. Many groves on a biological pest control program never receive sprays, and are often deficient in zinc. Application of zinc sulfate, zinc chelates, or other zinc sources to the acid sandy soils of Central Florida has not been a practical means of correcting zinc deficiency in citrus. This work was carried out in an effort to find a satisfactory and economical method of supplying zinc to citrus trees by applications of a zinc source to the soil.

A search of the literature on soil application of zinc disclosed that Camp (7) in 1934 was able to correct frenching in Satsuma orange trees on Arredondo soils in Florida by soil application of as little as one-half pound of zinc sulfate monohydrate per tree. He could not duplicate these results with citrus on the acid sands of Polk County, where even 5 to 15 pounds of zinc sulfate per tree gave only sporadic response. He was able to correct zinc deficiency (bronzing) in tung trees on Arredondo soil with only one-half pound of zinc sulfate per tree applied either in a ring or broadcast, but one or two pounds gave faster response. Zinc foliage sprays gave excellent results on both citrus and tung.

Blackmon (4) corrected zinc deficiency (rosette) in 15 to 20-year-old pecan trees on Coxville fine sandy loam by applying two pounds of zinc sulfate to the soil. Zinc sprays also corrected the rosette, but the effect did not last as long as the soil treatments.

Alben (1) in 1956 reported on soil applications of zinc ethylendiamine tetraacetate (ZnEDTA) around zinc deficient pecan trees in Texas and Louisiana. He obtained variable results in different soils, with best results on Ruston and Norfolk sandy loam of pH 5.4 to 6.4. None of the treated trees showed complete correction of the deficiency during the year treated, but in May of the next year all trees that received either one or two pounds of the chelate were rosette-free. Less satisfactory results were obtained in other orchards, some showing little or no benefit from the chelate treatments. From 20 to 30 pounds of zinc sulfate per tree required three years to correct rosetting of pecan trees on these soils. On coarse-textured neutral and slightly basic soils, 100 to 200 pounds of zinc sulfate per tree applied to the soil was required to correct the deficiency.

Blackmon and Dickey (5) broadcast zinc sulfate under peach trees on Norfolk fine sand at rates of one-half, two, and five pounds per tree. Zinc deficiency (little leaf) was corrected by all these rates, but five pounds resulted in temporary injury, shown by partial defoliation and slight fruit drop. Zinc sprays also gave good results.

Benson **et al.** (3) applied two chelates, ZnEDTA and zinc hydroxyethyl ethylenediamine triacetate (ZnEDTA-OH) to peach, apple, and sweet cherry trees in Washington at rates of one-half, one, and two pounds per tree, broadcast. The two-pound treatments increased zinc in peach leaves for both spring and fall

[1] Florida Agricultural Experiment Station Journal Series No. 823.

applications, whereas one pound increased leaf zinc only for spring application. One-half pound gave no increase. Zinc-deficient cherry trees were normal the second year after soil treatment with two pounds of ZnEDTA or ZnEDTA-OH, but zinc sprays failed to correct the deficiency. Two pounds of either of the zinc chelates gave little or no correction of zinc deficiency in apples.

Brusca and Haas (6) in 1955 grew rooted lemon cuttings in sand cultures, supplying zinc as the sulfate at rates varying from zero to 1.0 ppm, and from 1 to 15 ppm. From this and other experiments in soil and sand cultures, they concluded that a zinc concentration of 0.2 ppm in the nutrient solution prevented the occurrence of mottle-leaf (frenching), but greater concentrations stimulated additional plant growth, increased the intensity of green color, and produced larger leaves. Parker (10) reported in 1937 that spray application of zinc to severely zinc-deficient grapefruit trees in California gave outstanding improvement in yield and quality of fruit, but less improvement resulted from spraying moderately frenched trees. He concluded that in the absence of leaf deficiency symptoms, zinc treatment would have little if any effect on size and quality of the crop produced.

Wallihan et al. (14) applied ZnEDTA and ZnEDTA-OH to zinc-deficient avocado trees in California at rates varying from one to four pounds per tree. They found that one pound of ZnEDTA per tree applied to trees six years old raised the zinc content of leaves from 15 to 50 ppm and completely eliminated visible deficiency symptoms. Two and one-half years after treatment the zinc concentration in the leaves had not decreased and the trees remained free from zinc deficiency symptoms. Both types of chelates were effective with three different methods of application — dry, injected into the soil in solution under pressure, and dissolved in irrigation water applied through sprinklers. Gustafson (8) was able to correct zinc deficiency in avocado trees by soil application of zinc sulfate (23 to 28 percent zinc) at rates varying from one pound for two-year-old trees to 10 pounds for 20-year-old trees. Application was made in a band two to three feet wide at the drip of the trees. He found the soil application gave a slower response but lasted longer than foliage sprays. It is evident from the foregoing that results from soil application of zinc sulfate and zinc chelates have varied greatly with different tree crops and different soil types. Soil application of zinc to date on citrus, however, has generally been unsatisfactory.

Table 1. Zinc content of leaves of Pineapple orange trees on Lakeland sand two years after application of zinc.

TREATMENT PER TREE		Zinc in leaves		
		Piles	Broadcast	
$ZnSO_4$ pounds	Other material[1] pounds		Powder	Chunks
		ppm	ppm	ppm
none	Check	47[4]	—	—
5	none	68	48	53
10	none	—	61	—
5	5 WS	61	57	68
10	10 WS	—	60	—
5	5 $CaCl_2$	169	—	—
5	5 WS, 5 $CaCl_2$	—	—	54
none	5.2 ZnEDTA[2]	40	46	—
none	5.2 ZnEDTA, 5SA	61	—	—
3/100 gal.	1 $Ca(OH)_2$, 5 WS	46[3]	—	—
12/100 gal.	4 $Ca(OH)_2$, 5 WS	45[3]	—	—

1 WS — wettable sulfur; SA — soda ash.
2 ZnEDTA, 14 percent Zn; 5.2 lbs. equivalent to 328 grams zinc.
3 Applied as foliage spray.
4 No zinc applied.

MATERIALS AND METHODS

Several materials were evaluated as sources of soil-applied zinc for citrus by measuring their ability to increase the zinc content of leaves following their application to the soil. The studies reported here were carried out in two groves. One of these planted to Pineapple orange trees on Rough lemon rootstock growing on Lakeland fine sand near Avon Park, was the same grove in which earlier studies were reported (9). The other was a grove of Valencia oranges on grapefruit rootstock growing on a heavier Blanton sand near Wauchula. Soils in both groves had a pH of approximately 6.0.

The grove on Lakeland sand had not received a nutritional zinc spray since 1951. However, it was inadvertently given a zineb-oil spray in July, 1957. Since zineb contains 15.4 percent zinc, spring and summer flush leaf samples were washed with an acid detergent solution to remove the zinc residue prior to analysis for zinc. Leaf analysis indicated that trees in both groves were low in zinc. The Valencia trees were lower in zinc and also exhibited much more frenching than the Pineapple trees.

During 1956, 1957, and 1958 more than 200 different treatments were applied. Chelated zinc and inorganic zinc sources, including zinc sulfate, zinc oxide, zinc nitrate, and zinc chloride were applied alone and in combination with one or more other materials. Zinc fertilizers were applied to the soil in both powdered form and as hardened chunks. The hardened chunks were made by mixing the zinc material with water, allowing the mixture to harden, then breaking it into chunks varying in size from one-half inch to two inches in diameter. Application of the powdered materials was made in relatively high concentrations over limited areas under the trees, i.e., in 5 or 10 piles each having an area of one square foot, in 60 small piles, and in narrow bands not over one foot wide near the tree trunks. In addition, the powdered materials and hardened chunks were applied broad-

Table 2. Effect of soil application of zinc sulfate alone and in combination with other materials on zinc uptake by Pineapple orange trees growing on Lakeland sand.[1]

TREATMENT PER TREE			Zinc in Leaves			
			Piles		Broadcast	
Zinc source	Amt. pounds	Other material pounds	Aug. ppm	Feb. ppm	Aug. ppm	Feb. ppm
$ZnSO_4$	5	none	39	42	48	42
$ZnSO_4$	5	5 $CaCl_2$	207	143	32	—
$ZnSO_4$	2	5 $CaCl_2$	84	73	31	—
$ZnSO_4$	1	5 $CaCl_2$	35	42	32	—
$ZnSO_4$	5	5 NaCl	59	128	52	—
$ZnSO_4$	2	5 NaCl	—	108	—	—
$ZnSO_4$	5	5 $Ca(NO_3)_2$	71	57	45	—
$ZnSO_4$	5	5 $NaNO_3$	59	69	39	—
$ZnCl_2$	4	none	58	54	44	56
$ZnCl_2$	4	5 $Ca(NO_3)_2$	58	65	81	59
$Zn(NO_3)_2$	5	none	—	76	—	46
$Zn(NO_3)_2$	5	5 $CaCl_2$	—	93	—	67
None	—	Checks[2]	35	24	35	24

1 Treatments applied Feb. 1957, spring flush leaf samples taken Aug. 1957 and Feb. 1958.
2 No zinc applied.

cast under the spread of the trees.

Zinc-supplying mixtures which brought about high uptake of zinc in 1956, or showed promise of doing so with some modification, were studied further in 1957 and 1958. Treatments reported for the Pineapple orange grove were applied to three trees. In the Valencia orange grove, the zinc sulfate—calcium chloride mixtures were applied to three trees, whereas the zinc chelate treatments were applied to two trees.

Leaves were sampled for zinc analysis from two to four times during the 12-month period following treatment, including separate samplings of spring, summer, and fall flush leaves of the current year's growth. Zinc determinations were made by a modification of the polarographic method of Barrows et al. (2).

EXPERIMENTS ON LAKELAND SAND

At least half of the treatments applied to this soil in 1956 and 1957 failed to increase the amount of zinc in the leaves above that from the untreated check trees, and only limited data from these unsuccessful treatments are reported. Some of the treatments resulted in relatively small increases in zinc content of the leaves. Emphasis in the data reported in the following sections is placed on those treatments that brought about large increases in zinc uptake by the trees.

1. 1956 Treatments.—In a previous paper (9) it was reported that a mixture of zinc sulfate and calcium chloride applied in small piles was the most successful of 70 different zinc treatments. The spring flush leaves from trees receiving 10 pounds of this mixture contained 170 ppm of zinc within four months after treatment. This was four times as much as in trees receiving any other soil treatment, and more than five times as much as in trees given the conventional nutritional zinc spray.

To further evaluate these 70 treatments, leaf samples were taken in the fall of 1957 from trees which had been given various zinc treatments in late 1955 or early 1956. These samples, taken about two years after the treatments were applied, showed that the mixture of five pounds each of zinc sulfate and calcium chloride applied in small piles still maintained a high level of zinc in the spring flush leaves (Table 1). The wide variety of treatments involving applications of zinc sulfate alone or with wettable sulfur applied in piles or broadcast were largely unsuccessful in raising the zinc content of foliage during the second year after application.

2. 1957 Treatments — (a) Inorganic zinc sources.—The effects of soil application of zinc sulfate, zinc chloride and zinc nitrate alone and in combination with other materials are shown in Table 2. When five pounds each of zinc sulfate and calcium chloride were applied in 60 piles, the August leaf sampling showed 207 ppm of zinc in the spring flush, as compared with only 32 ppm when the same mixture was applied broadcast. Smaller amounts of zinc sulfate applied in piles resulted in considerably less uptake of zinc.

The mixture of five pounds each of zinc sulfate and calcium chloride was applied in piles to Pineapple orange trees at several different times from February to July, 1957. In every case, high levels of zinc varying from 115 to 219 ppm were found in the spring flush leaves sampled three months or more after treatment. The zinc contents of spring flush and fall flush leaves were markedly affected by timing of the treatments. For example, the February treatments sampled in December showed 165 ppm zinc in the spring flush leaves, and only 43 ppm zinc in the fall flush. The same treatment applied in July and sampled in December showed 115 ppm zinc in the spring flush leaves and 197 ppm in the fall flush.

In an effort to better understand the reason for the increased uptake of zinc when zinc sulfate was mixed with calcium chloride, the effects of calcium and chloride ions were studied separately, by applying combinations of zinc sulfate with calcium nitrate and with sodium chloride. In addition, zinc chloride at a rate equivalent to five pounds of zinc sulfate was applied separately and combined with calcium nitrate. Zinc analysis in Table 2 show much smaller increases in uptake of zinc from these combinations (as compared with zinc sulfate alone) than were obtained with zinc sulfate and calcium chloride. A possible exception is the mixture of zinc sulfate and sodium chloride, which increased zinc uptake only slightly in the leaves sampled in August but had reached higher levels by the February sampling date.

Ammonium sulfate mixed with zinc sulfate stimulated zinc uptake to about the same degree as calcium nitrate and sodium nitrate. Calcium sulfate (gypsum), superphosphate, borax, and colemanite all failed to appreciably increase zinc uptake from zinc sulfate when the mixtures

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Table 4. Effect of soil application of zinc chelates mixed with soda ash or zinc sulfate on uptake of zinc by Pineapple orange trees on Lakeland sand.

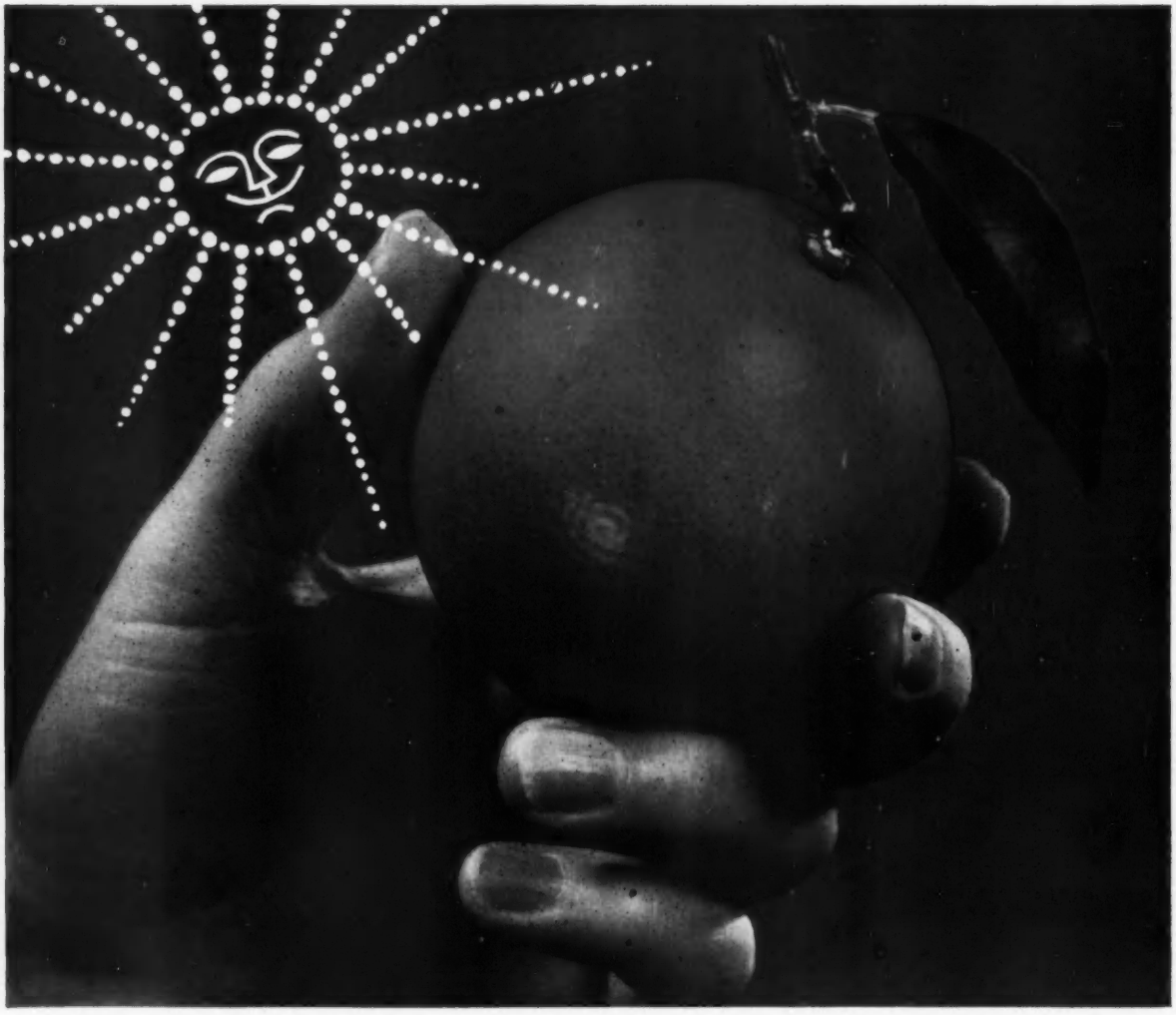
TREATMENT PER TREE					Zinc in Leaves	
Chelate	Chelated zinc grams	Soda ash pounds	$ZnSO_4$ pounds	How applied[2]	Spring flush ppm	Fall flush ppm
None	—	Check	—	———	47	32
ZnEDTA	328	10	none	10 piles	228	104
ZnEDTA	328	10	none	10 holes	52	36
ZnEDTA	328	15	none	Band	289	102
ZnEDTA	100	15	none	Band	149	97
ZnEDTA	328	none	5	10 piles	186	86
ZnEDTA	100	none	5	10 piles	76	52
ZnEDTA	100	none	5	60 piles	55	41
ZnEDTA	100	none	5	Band	62	30
ZnEDTA	100	none	5	10 holes	48	41
ZnEDTA-OH	328	10	none	10 piles	384	154
ZnEDTA-OH	328	none	5	10 piles	145	64
None	—	none	5	60 piles	55	25
None	—	none	5	Broadcast	54	28
None	—	none	5	10 holes	46	43

[1] Treatments applied July, 1957. Leaves sampled Dec. 11, 1957.
[2] Where 10 piles were used, each pile covered one square foot; for 60 piles, the area of each pile was smaller; holes were one square foot in area, and 10 inches deep; bands were one foot wide, extending entirely around the tree, with inside of band three feet from tree trunk. Broadcast application was confined to the area under the spread of the trees.

Table 3. Zinc content of leaves and fruit of Pineapple orange as affected by soil application of zinc.

Plant part	Zinc, ppm	
	Treated trees[1]	Check trees
Leaves, spring flush	165	47
Leaves, fall flush	43	32
Seeds	28	26
Pulp	21	14
Peel	25	15
Whole fruit	23	14

[1] Mixture of 5 pounds zinc sulfate and 5 pounds $CaCl_2$, applied to soil in 60 piles in Feb. 1957. Sampled December 11, 1957.



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Benson Dedicates U. S. Fruits And Vegetable Products Laboratory

Address by Secretary of Agriculture Ezra T. Benson at the Dedication of the New U. S. Fruits and Vegetable Products Laboratory in Winter Haven.

I am glad to be here today because of what this great U. S. Fruit and Vegetable Products Laboratory represents—what it promises for the future of Florida agriculture and of U. S. agriculture—the promise it holds out to all our people — a promise of better fruits and vegetables, better income to farmers, better diets, better nutrition, better health, better living.

I am glad to be here also because of the opportunity we now have to pay richly deserved tribute to our agricultural scientists — to **your** scientists here in Florida and their colleagues all over the nation—yes and to those working in foreign lands, too.

Both as Secretary of Agriculture and as an American citizen, I want to tell you men and women of science that we, the people, are grateful for the wonderful work you do. You are real benefactors of mankind. In the name of our farmers and all our people, I salute you.

You can describe science in many ways. One of the little descriptions that I like is this: Science is the knowledge of the shortest distance between two points — and the scientist is the person who works tirelessly to discover it.

That is what this laboratory is designed to do: To find the shortest route to better products and better uses of fruits and vegetables. This is what it has been doing since 1931 when it began operations as the U. S. Citrus Products Station, located on the other side of town, with a staff of two scientists.

Great Program

What a long way we have come in 27 years!

In 1931 citrus processing was just an infant among U. S. industries. It took about 1 million boxes of citrus a year out of 28 million boxes grown in the South. Last year the South produced 135 million boxes of citrus, and 89 million boxes were processed. One million boxes processed in 1931 — 89 million boxes processed in 1957! It's a tremendous achievement.

This progress was due in no small measure to major advances in the technology of citrus processing — advances to which this station made significant contributions.

Here at Winter Haven was developed a flavor-saving method of flash pasteurization. This was the foundation upon which the citrus juice canning industry was built prior to the introduction of concentrates.

And then, out of cooperation between the Florida Citrus Commission and this Winter Haven Station came one of the greatest of all modern advances in food processing —the development of frozen citrus concentrates.

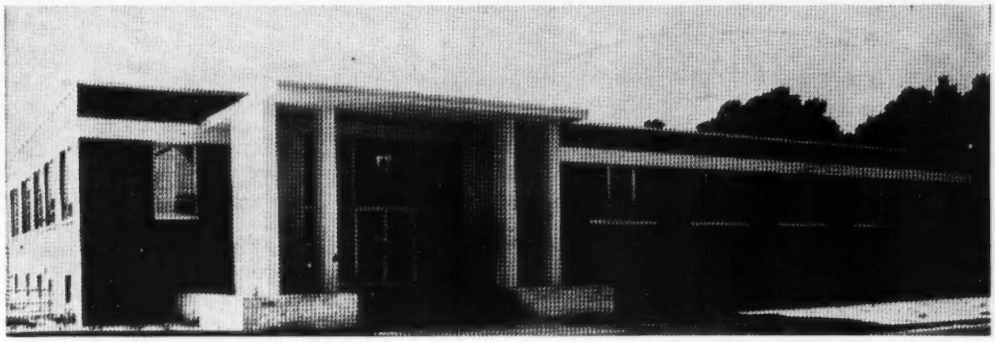
The specific findings that led to the development of the fabulous frozen concentrate industry that we know today were announced in 1945.

Frozen concentrated orange juice has brought a return to orange growers of over $100 million in one year. That's more than three times what the **entire Florida citrus** crop —not just oranges alone — brought when this laboratory was started.

Processing Rapid

The rapid expansion in Florida citrus processing that resulted from frozen concentrated orange juice accented some persistent old problems — problems requiring continued and expanded research attention. Consequently, with the farsighted encouragement of the Florida Citrus Commission, the program at Winter Haven has been directed more and more toward the development of fundamental information — in other words, basic research.

With the improved facilities afforded by this building, with its nine basic laboratories, not only citrus but vegetable and subtropical fruit research projects can also be included in the laboratory's program.



That's the job ahead. That's the challenge. We know the personnel of this laboratory will meet it with the same spectacular success with which this station has met its challenges in the past. Much depends on this laboratory.

Yes, much depends on **research** if we are to have the prosperous, expanding, and free agriculture that is our goal for farmers and ranchers here in Florida and all over the United States.

I wish I could talk in detail about the vast achievements of the laboratories at Orlando, Olustee, and Canal Point. They have accomplished so much. And there are so many prob-

lems still to be solved.

The serious freeze last year that cut orange production by 13 million boxes points up the need for root stocks with greater cold hardiness.

The burrowing nematode is causing losses on several thousand acres. We need citrus varieties with resistance to it.

We need ready defenses against Tristeza.

We need new insecticides that are more effective against pests and less toxic to people and animals.

Some of our soils are literally burning away as the highly organic material is oxidized. About half of the best organic soils have been lost in this way within the past 50 years.

Effect of Water Table

The losses seem to be directly related to the water table. They occur as the water table is lowered. They can be prevented if a high water table is maintained.

In other parts of Florida farmers have too much water part of the time — not as much as their crops need at other times. It will take both drainage and irrigation to assure good returns.

Quick Results

The Mediterranean fruit fly was discovered near Miami in April 1956. It was wiped out in Florida in a year and a half by cooperative action. The USDA and the Florida Plant Board geared themselves to an emergency, around-the-clock effort. Senator Holland, Governor Collins, and many others made outstanding contributions.

Altogether, 800,000 acres were treated intensively. At a cost of $10 million in State and Federal funds, two of Florida's major industries — fruits and vegetables — with production worth $400 million a year were protected. By wiping out the Medfly while it was still within the bounds of one State we protected the soft fruit production of the entire South and Southeast.

All of these research efforts are pointing the way to a prosperous, expanding, and free agriculture.

Research Most Important

As we dedicate this laboratory, recalling how much has been accomplished in the past and how much is being done in the present, our hopes rise high that other accomplishments, even greater, will come in the future.

It has always been true that research and education are the golden keys to progress. They unlock the door of opportunity to the further development of the nation's resources —to new products and new uses — to greater efficency and larger income — in short, to a more abundant life.

I firmly believe that the most important method of promoting the longtime welfare of farm people and the nation is now — has long been — and will continue to be — **adequate programs of research and education.**

Largely because of research:

Today's farm worker produces in one hour what it took two hours to produce in 1940 and three hours in 1910.

Today's farm worker provides food and fiber for himself and 23 other persons. Think of it! Only five years ago he produced for himself and 17 others.

Our farm people are less than one percent of the world's people; yet they produce one-fifth of the world's output of red meat, and nearly one-third of the world's milk.

This year our farmers have performed an amazing feat. They have not merely **broken** all previous records for production — they have **smashed** them.

This year's output of crops is a good 10 percent larger than ever before. Livestock production is up 2 to 3 percent. Total farm output — crops and livestock — is up 8 percent. This is nearly twice as big an increase **in one year** as we had in the **entire decade of the 1920's.**

Big Production

What makes the 1958 production so impressive is the fact that this tremendous outpouring of farm crops was produced on the smallest acreage in the past 40 years. This year's production would have been even bigger without the Soil Bank.

Our yields per acre are 43 percent higher than a decade ago.

It's true, of course, that the tremendous 1958 output has increased our surpluses of some commodities. We face difficult problems of marketing more than customers are willing to take at the artificial levels represented by some of our prevailing price supports.

These problems are extremely difficult. I know that from personal experience in the administration of our farm programs. But the very fact that our agriculture is so productive should be a tremendous boon to farmers and to the whole nation.

Most of the programs affecting agriculture fall into two broad groups. In one group are programs intended primarily to improve here and now the prices and incomes received by farmers. In the other are programs designed to reduce the costs of producing and marketing farm products, improving their quality, and developing new uses and expanded markets.

Agriculture today needs both types of programs. But they are needed in the right proportion. It is my firm conviction that we have in recent years given far too much emphasis to price and income programs and far too little emphasis to programs that help farmers increase efficiency, improve quality, and expand markets.

Seeks Legislative Improvement

There have been some heavy costs to farmers and to taxpayers from unwise agricultural policies and legislation which stem from laws still on the books — laws which we have repeatedly tried to improve.

Costs to the Federal Treasury of the programs to support farm prices and farm incomes are only a small part of the total costs to agriculture. And more than half the dollars and cents costs have been for the 6 so-called basic commodities — out of more than 200 commodities farmers produce.

The huge costs of the support programs would be well worth it if they had brought a solution to the problems. But they have not brought a solution. They have led to other problems, and other costs to agriculture, and they will continue to do so as long as these unsound programs are in effect.

Let me name some of those costs other than the dollars and cents costs to the Federal Government and to taxpayers.

Rigid price support programs and the necessary controls that accompany them cost farmers some of their basic freedoms:

Freedom to plant, to market, to compete, and to make their own decisions. These are real costs to farmers — costs which cannot be measured in terms of dollars and cents. They will continue until we have eliminated their causes.

I want to emphasize one fact above all: **The old rigid programs are directly contradictory to the objective of an expanding, prosperous, and free agriculture.**

(Continued on page 12)

"Our ORTHO® Fieldman is as near as our phone"

say citrus grove caretakers Bruce Fullerton and Lincoln Walker of Lake Wales, Florida

"When trouble comes, our ORTHO Fieldman is as near as our phone. He checks our groves for infestations and gives us up-to-the-minute helpful information." They add, "ORTHO advice has always proven to be sound advice."

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BENSON DEDICATES U. S. FRUITS AND VEGETABLE PRODUCTS LABORATORY

(Continued from page 10)

Need New Markets

To **expand**, agriculture needs new markets. And new markets can be developed. Soybean producers have proved that. They chose freedom rather than controls, and they now provide three-fifths of all high protein feeds. Twenty-five years ago, soybean meal accounted for only 11 percent of the total protein meal consumed. Now that figure is 79 percent.

To be prosperous, agriculture must be able to compete successfully against foreign and substitute products. The restrictions of the old formula gave agriculture's competitors an almost unbeatable price advantage. It will continue to do so for any crops to which it is applied in the future.

To be free, farmers must be permitted to make their own management decisions on their own farms and ranches. The application of the old formula requires controls that transfer part of the management of agriculture into the hands of government. This will continue to be the case for any crops for which the old rigid formula remains in the law.

Since 1954 we have repeatedly asked for changes in the basic farm legislation which would aid agricultural adjustment, provide more freedom for our farmers, and raise the levels of income.

We have made progress toward sounder programs through the Agricultural Act. of 1954 — the Act of 1956 — and last summer's Agricultural Act of 1958.

These were steps in the right direction. But they were slow steps, short steps, extremely difficult to achieve. These laws did not make all the program changes that we asked for — all the programs changes that were needed. We still do not have the full program we have asked for. We have had to fight every inch of the way to get more flexibility into the pricing mechanism. And on some commodities we got nothing. On others we got a little flexibility but not enough. That is why the surpluses have built up. And that is why we had to request legislation to give us authority to move the surpluses out after they came into government hands.

Farmers Seek More Freedom

Just last week more than 71 percent of the farmers who voted in the corn refrendum spoke for more freedom to make their own decisions and against undue government interference in their affairs.

Farmers are now free to plant as much or as little corn as they wish with the safeguard of a reasonable price support level. This is a sensible arrangement. Corn Belt farmers have acted in their own best long-term interests.

We have been working out the recommendations we shall make to the Congress early in the coming session. We are studying the problems exhaustively. We are consulting and working with the bipartisan National Agricultural Advisory Commission, legislative leaders, and representatives of the farm agencies. We are resolute in our determination to recommend what is best for farmers and all our people.

What American farmers need more than anything else is to be able to produce economically, and sell profitably, more agricultural products— not just in this country but in vital overseas markets as well.

If our agriculture in some respects has fallen behind the other segments of our national economy it is because of two basic failures: The failure to achieve parity in research. And the failure to understand that artificially-high price supports are not a panacea. There are no cure-alls for agriculture's ills.

While agriculture has been bursting with desire and ability to produce, our national farm policy has been dominated by notions of scarcity economics, and acreage limitations. This policy has tried unsuccessfully to ignore supply and demand. It has attempted to insulate farmers against the competitive forces that make our American economy tick. It has discouraged efficient and progressive farmers. It has lost us markets through inflexible pricing.

But we have only scratched the surface.

Mechanization, for example, is still being hampered in great sectors of agriculture by problems that only research can solve.

Research results in fruit and vegetable powders are already opening up entirely new markets and areas of consumption.

We could go on with many other illustrations. There is vast potential in agricultural science, engineering, marketing, and utilization. Our challenge in government is to put enough emphasis on research so that this potential can be realized — for the benefit of farmers and all our people.

During the past 6 years we have constantly stressed the need for expanded agricultural research. We have been deeply gratified that the Congress has doubled farm research appropriations during this period.

Research Serves All

Programs of research and education serve all the people. They produce a better product — find new uses for crops — enable farmers to grow more units per acre, more meat per animal, more milk per cow, more eggs per hen. They result in food and fiber of better quality — food that is more nutritious — fiber that is better fitted to specific uses.

They expand existing markets — create new markets. They cut marketing costs — reduce spoilage in transportation, handling, and processing.

Programs that produce such results sell themselves to the people.

The new facilities that have been provided here will be of tremendous value to the citrus and other subtropical fruit and vegetable producers — not only in Florida but throughout the United States and, indeed, throughout the world.

I'm sure the scientific staff is proud of the new quarters. And I know that all of you are equally happy about them.

But let us remember this — a building does **not** make discoveries. Research achievements are the fruit of the ideas of trained, dedicated men and women. As I look about me at the people gathered here — as I recall the history of this laboratory — as I see the concern all of you have for the welfare of agriculture, and the welfare of your great State, I cannot help being optimistic about the future.

Someone once wrote "The world will never starve for want of wonders, but only for lack of wonder." The "wonder" that is the dominant attribute of the agricultural scientist — the questions that are always in his mind — will make it possible for American agriculture to continue to travel the road of science — the shortest distance between two points.

May a kind Providence sustain you and all of us in these important endeavors.

Effect of Sub-Freezing Temperatures On The Varieties of Citrus Seeds

GEORGE E. HORANIC AND
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CROPS RESEARCH DIVISION
AGRICULTURAL RESEARCH SERVICE, U. S. D. A.

Introduction

The low temperatures during the winter of 1957-58 have caused citrus nurserymen and seed dealers to wonder how much reduction of viability may occur in citrus seeds collected after a severe freeze. Batchelor and Webber (1) state that "the seeds from frost-injured fruits are evidently as good to use as those from unfrosted fruits. This was found to be true with frozen fruit in Florida after the very severe freeze of 1894-95." This very general statement does not delineate the extremes of low temperature that citrus seeds can withstand, and it is certain that there is some limit. Damage might take place in two ways: 1) direct injury to the seeds by low temperatures, and 2) injury due to fermentation within freeze-damaged fruit. In the latter case membranes and cell walls are ruptured by freezing, allowing the fruit juice to come into direct contact with the seeds. The fermenting juice could, conceivably, cause injury to the delicate citrus seed embryo.

It is well known that seeds of stone fruits particularly those of peaches, are easily injured by even short exposures to the fermenting juices of their fruits. Such seeds may appear to be sound and bright in color and have normal-appearing cotyledons, for many weeks after the fermentation exposure. They simply do not germinate and eventually rot in the seedbed. We have experienced one similar disaster with a valuable lot of Carrizo citrange seeds allowed to remain in a bucket over the weekend, wet and surrounded by their gelatinous coating. After 3 days of fermenting in this state they were washed and carefully stored, but upon planting only a few seeds of many thousands germinated. Apparently this is not a common experience with citrus seeds generally, for Hume (2) writes regarding methods of securing seeds from fruit. "Another method is to place the fruit in barrels and allow it to rot, after which the seed is washed free from the pulpy mass."

Procedure

To gain information on the effect of low temperatures and of fermentation on citrus-seed viability, we devised a number of simple experiments. Seeds of the commonly used rootstock sorts—Rough lemon, Cleopatra mandarin, sour orange, and sweet orange (chiefly Pineapple variety)—were used. Seeds of the various sorts were extracted from sound fruit, washed, and surface-dried for the several experiments. In each test 100 seeds were used, and the germination results were expressed as percentages.

The germination tests were made by planting the treated seeds in flats containing a peat moss-vermiculite mixture in the greenhouse. The seeds were carefully spaced so that an accurate germination count could be made for each seed regardless of the number of nucellar embryos which sprouted. At this point it should be mentioned that seeds germinating with multiple embryos were also counted, but the degree of polyembryony was not influenced by any of the treatments and is therefore omitted from the data presented.

Direct effect of low temperatures. Three lots of 100 seeds each of Pineapple orange were put at once in polyethylene bags to prevent moisture loss. Three other lots of 100 seeds each were allowed to dry on the laboratory desk for 24 hours, during which period they lost 25.3% of their moist weight. A third group of 3 lots were similarly dried for 48 hours, and thereby they lost 32.7% of their moist weight. These seeds were then also placed in polyethylene bags and one lot of each treatment placed in carefully controlled temperature chambers for 24 hours at 15°, 20°, and 25° F., respectfully. Upon removal from the freezing chambers the seeds were planted for germination counts. The results are shown in Table 1.

It is evident that 25°F. did not harm the fully moist seeds nor those dried beforehand for 24 hours. Seeds in both of these prior treatments, however, were considerably reduced in viability by 20°F. and were killed by 15°. As for the seeds dried for 48 hours, it is not clear from the data whether the marked impairment in germination after exposure to 20 and 25°F. is the result of cold injury or drying injury or both. Although it is well known that citrus seeds lose viability rapidly with increased desiccation, it seems unlikely that the additional 24 hours of drying would in itself affect germination so adversely.

Effect of juice fermentation. Sweet orange seeds (var. Pineapple) were extracted from the fruit, placed in beakers, and covered with juice of their fruits. The respective germination percentages after fermentation for 0, 2, 4, and 6 days were 95, 96, 89, and 88. A slight decrease in germination from 4- and 6-day treatments is indicated. It does not follow that other kinds of citrus seeds would be similarly affected.

Seeds from frozen fruits. To determine the effect of low temperatures on seeds still in the fruit, as well as the effect of subsequent fermentation within the frozen fruit, sound fruits of Cleopatra mandarin, Rough lemon, sour orange, and sweet orange were placed in cold

(Continued on Page 14A)

Table 1. Percent germination of sweet orange seeds after exposure of 24 hours at the temperature indicated

Pre-freezing treatment	15°F.	20°F.	25°F.
None	0	70	94
Dried 24 hours	0	74	93
Dried 48 hours	1	9	23

Table 2. Percent germination of citrus seed extracted 0, 7, or 14 days after fruit had been 12 hours in 18° and 28°F. storage room.

Variety	Control (no freezing)	Immediately After thawing after		Holding for 7 days after		Holding for 14 days after	
		28°	18°	28°	18°	28°	18°
Cleopatra mandarin	98	96	79	98	89	97	72
Rough lemon	96	95	92	93	95	99	89
Sour orange	95	92	84	87	83	84	67
Sweet orange	97	90	94	93	97	76	58

Effect of Sub-Freezing Temperatures On The Varieties of Citrus Seeds

(Continued from Page 12A)

storage rooms at 28° and 18°F. for 12 hours. At these storage temperatures there was, of course, a progressive temperature drop in the interior of the fruits, which was observed by means of thermometers inserted in the fruit. At 28°F. the interior of the fruit reached the storage temperature within a few hours and remained at 28 + 1° for the rest of the storage period. The interior of the fruit was much slower in attaining the storage temperature of 18°. Cleopatra mandarin, which is a small, thin-skinned fruit, was below 20°F. for 5 hours. Rough lemon, larger and thick-skinned, did not reach 20°F. until the last 2 hours of storage. Thus the seeds of the several kinds of fruit were not all subjected to the same length of exposure. At both 18° and 28°, however, the fruits were frozen and broke down when removed from the cold rooms and held on the laboratory desk. Those from the 18°F. storage broke down faster and more completely than those from 28°F. One hundred seeds to be used as controls were removed from each variety of fruit prior to placement in the low-temperature rooms. Additional lots of 100 seeds were removed from the fruits immediately upon thawing and also after 7 days and 14 days on the laboratory desk. The germination results from these treatments are presented in Table 2.

In comparing the germination of the controls (seeds from untreated fruit) with that of seed extracted immediately after thawing, it is evident that at 28°F. there was no impairment of germination. At 18°F., however, the Cleopatra mandarin and sour orange seeds suffered some cold damage, whereas the Rough lemon and sweet orange seeds were not injured. The Cleopatra mandarin fruits, as already noted, were small, and their interior temperature drop was more abrupt than that of the larger fruited varieties. Difference in fruit sizes, however, does not explain the seeming damage to the sour orange seeds.

Any impairment of germination of seeds removed from the fruit 7 and 14 days after freezing would be attributed to a fermentation effect in the decomposing fruit. Sour orange and sweet orange seeds in both the 18° and the 28° lots apparently suffered damage from this effect after 14 days in the injured fruit. Cleopatra mandarin and Rough lemon seeds appear not to have been affected by the fermentation process (extracted immediately compared with 14 days after thawing).

Summary and Conclusions

Seeds of sweet orange extracted from sound fruit and placed at controlled temperatures of 25, 20, and 15°F. for 24 hours were not injured at 25°, partially damaged at 20°, and practically all killed at 15°.

Seeds taken from fruit which had been severely frozen had reduced viability if the temperature within the center of the fruit reached a critical temperature for a sufficient period. These limits were not definitely established in this study because of the differences in the times for fruits of the several varieties to reach the minimum exposure temperature at the center. However, with fruit exposed to 28°F. for 12 hours none of the varieties suffered seed damage. Seeds of Cleopatra mandarin and sour orange from fruit exposed for 12 hours at 18°F. showed some reduction of viability, but those of Rough lemon and sweet orange did not. Presumably this varietal difference was largely due to differences in rate of fruit cooling. From a practical standpoint the experiment demonstrated that citrus seeds can be cold-injured in the fruit by a severe freeze but that for this to happen temperatures of 20°F. and lower would have to be of considerable duration.

It was also demonstrated that seed viability can be reduced in some varieties by fermentation within fruit which has been badly frozen even though the actual temperatures are not low enough to injure the seed. In the work reported here the viability of both sweet and sour orange seed was lowered, but not that of Cleopatra mandarin or Rough lemon, by 14 days of fermentation in badly frozen fruit.

Literature Cited

1. Batchelor, L. D., and H. J. Webber. The Citrus Industry. Vol. II, Univ. of Calif. Press, 1948: p. 3.

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15,000 cases of grapefruit juice was packed in Florida in 1915, the first year of the canning industry in Florida.

CITRUS ESTIMATE—DECEMBER 1, 1958
(Released by U. S. Department of Agriculture Dec. 10, 1958)

COMPARISON OF DEC. 1, 1958 ESTIMATE WITH ACTUAL PRODUCTION FOR PRIOR YEARS

	Actual Production* 1957-58	Estimated For 1958-59 (At Dec. 1)
ORANGES		
U. S., All	109,055	122,135
FLORIDA, All	82,500	85,000
Early & Midseason	51,200	49,200
Valencias	29,800	34,000
Temples	1,500	1,800
California, All	23,100	34,000
Early & Midseason	9,100	14,000
Valencias	14,000	20,000
Texas, All	2,000	2,300
Arizona, All	1,250	650
Louisiana, All	205	185
GRAPEFRUIT		
U. S., All	39,780	42,500
FLORIDA, All	31,100	34,000
Seedless	17,600	18,000
Other	13,500	16,000
California, All	2,400	2,300
Texas, All	3,500	4,200
Arizona, All	2,780	2,000
TANGERINES		
FLORIDA	2,100	4,500
Total U. S. Citrus	150,935	169,135
Total Florida Citrus	115,700	123,500

* Thousand Boxes

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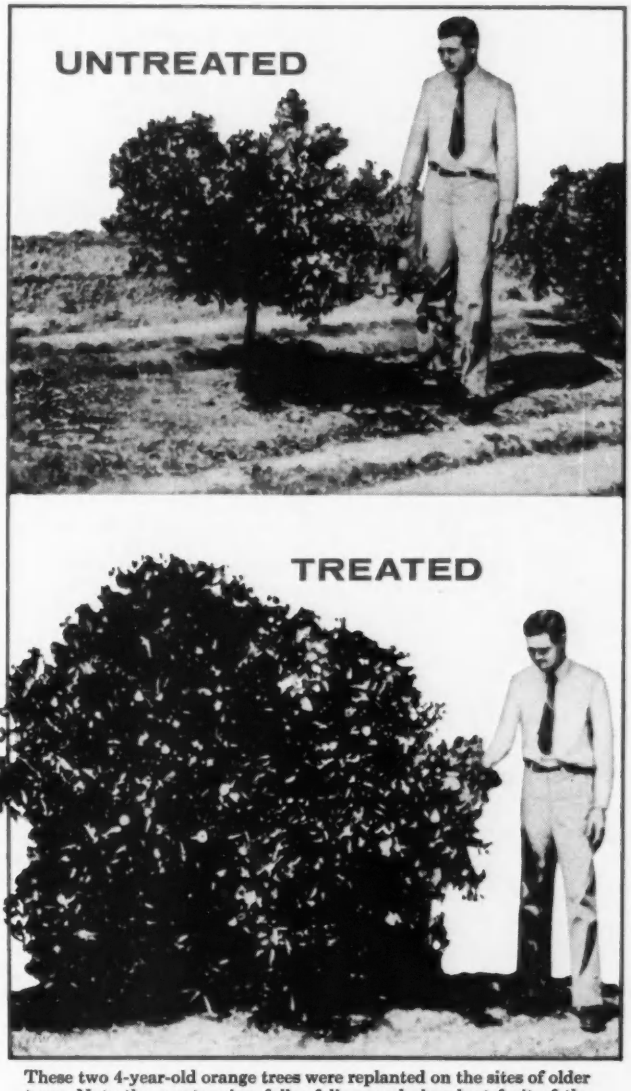

These two 4-year-old orange trees were replanted on the sites of older trees. Note the greater size, fuller foliage and abundant fruit of the tree growing in soil treated with nematode-killing D-D Soil Fumigant.

These pictures tell an important story. The trees were planted in the *same soil*, at the *same time*, but with *one* big difference. Before planting, the soil around one tree was treated with powerful, nematode-killing D-D Soil Fumigant . . . *and what a difference it made.* Look at the results!

You, too, can get these results in your citrus groves if root-destroying nematodes are a problem. Treat with powerful D-D Soil Fumigant before you set out a new orchard or replant trees. It is easily applied with conventional gravity-flow or pressure-feed tractor attachment directly to the soil. There it becomes a penetrating gas, killing nematodes as it spreads.

Young trees planted in soil treated with powerful D-D Soil Fumigant often come into production a *full season* or more before trees planted in untreated soil. This all adds up to bigger and better yields . . . bigger profits for you.

Now is the time to start your replants toward an earlier, more productive harvest. Knock out nematodes with powerful D-D Soil Fumigant. It is available from your pesticide dealer. For further information, see him today or write to:

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GROWERS COMMITTEE — All officers and members of the executive committee of the Florida Fruit & Vegetable Association were re-elected at the annual meeting of the organization to serve during the 1958-59 season. [Left to Right] Pictured are: Roy Vandegrift, Jr., Pahokee, president, Luther L. Chandler, Goulds, J. P. Harllee, Jr., Palmetto, Andrew Duda, Oviedo, Rudolph Mattson, vice president and immediate past president, all members of the 5-man executive committee, and Joffre C David, Orlando, secretary-treasurer and general manager.

Letters To The Editor

About 1938 I discovered one Orange tree in a large grove among old sweet seedling trees in Seminole County, Florida, which fruits were of the most beautiful color I had ever seen.

I gave it the name "MAIDEN'S BLUSH ORANGE" due to the reddish blush contained on the golden yellow rind.

This red coloring was found in fantastic patches, of varying patterns most pleasing to the eye. Certain of these fruits were marked longitudinally with broad bands of a rich red color all around the fruits so marked.

It was February when I discovered this tree and the fruits were fully matured, and of mottled reddish flesh. It was one of the blood orange group, but an etirely different and distinct strain or variety.

The flavor of these oranges was different and quite distinct from any other citrus fruit I had ever sampled, strongly reminding one of STRAWBERRY and fine orange flavor in a blend that was unbeatable for any orange.

For 13 years I lost this tree which I could not seem to locate in this grove, but finally succeeded. I purchased all the fruit from the owner for the purpose of studying the color of the juice and especially for collecting all seeds from the very deepest-colored fruits in an endeavor to produce new strains of this variety which might even exceed the qualities of the parent type.

During the operation of extracting seeds, I decided to collect a quantity of the juice for chilling, and to my great astonishment, discovered for the first time, that the coloration of the juice was of a **beautiful, rich cherry-red color.**

More amazing still was the fact that upon separation of pulpy matter to the bottom of the jars, the clear liquid at the top was of a lovely clear dark cherry-red color.

I contacted the Citrus Research Chemists of the Florida Citrus Mutual, whom were seemingly greatly impressed with the prospects held by the new fruits. I was asked to send mature fruits for processing trials to ascertain what results might be had. Freezes, failure of the owner to save the fruits, and picking crews forgetting to leave the marked tree unpicked, all thwarted my efforts to obtain the necessary samples for analyzing. Hence as yet there have been no test run made.

It is quite conceivable that a new type concentrate or single strength juice deal made with red-juiced oranges of outstanding flavor might very well stimulate sales.

Donald John Nicholson

The Florida Citrus Commission collected over 6 million dollars in excise advertising taxes in 1957-58.

Tristeza And Other Virus Diseases Of Citrus Found In Bombay State

By Dr. R. L. Nagpal, Horticulturist In Charge Citrus Dieback Research Scheme, College of Agriculture, Poona, India. Member of Staff At Florida Citrus Experiment Station in 1948 and 1949

Tristeza disease, which was originally reported from South America as a disease of citrus trees on sour orange stock, according to Wallace (11), is now known to be present in North America, South America, South Africa, West Africa, Hawaii, Australia, New Zealand, Java, Ceylon and Fiji Island, but has not so far been reported from any part of India.

The citrus trees in Bombay state, however, are known to suffer from various disorders which are grouped under the general heading of 'Dieback'. Although the diseases were in existence even before 1920, but have attained serious proportion during the last decade or so and have caused considerable loss to the fruit growers. Thousands of trees have either died or are in various stages of decline. There have been very few fresh plantings during the last few years.

Climate and Irrigation

The climate of citrus growing areas of Bombay state is mildly tropical and the minimum temperature during the coldest season seldom goes below 40° F and the maximum temperature during April-May, the hottest months, goes up to 105° F. The rainfall is hardly 15-25 inches mostly during June to September and the irrigation has to be given regularly.

The plants young and old are irrigated by basin system. The soils are rather heavy, retentive of moisture and liable to water logging. The rootstocks commonly used is 'Jamburi' which is quite similar to rough lemon though not identical with the same.

Sour orange, which should be more adapted to such soils has never been used as a rootstock in commercial practice. The sweet orange variety under cultivation is known as Mosambi and according to Bonavia (1) was most probably imported from Mosambique in latter part of last century. Hodgson (7) also appears to hold the same view about the origin of this variety in India.

Nature of Soil

In view of rather heavy nature of the soil and better adaptability of sour orange rather than rough lemon rootstock under such soil conditions some attempts have been made at the Fruit Research Station at Poona to bud Mosambi variety of sweet orange to sour orange, but the budlings did not survive beyond 2-3 years and in most cases died within a year of sprouting.

Previosuly Brown (2) reported the failure of sour orange as a rootstock in Peshawar, now in Pakistan and over a thousand miles away from Poona.

Subsequently in 1944-45 the author had found that Valencia late variety of sweet orange grew well on sour orange rootstock at Montgomery, but the budlings of the same variety on shaddock rootstock died within six months of sprouting.

A large number of sour orange seedlings were budded with mosambi scion taken from healthy and 'Dieback' affected trees at Poona during 1955, and it was found that within two months after sprouting, the budlings started wilting and within one year all the plants, irrespective of whether the budwood was taken from healthy or affected trees, had died.

In view of the fact that it is the tristeza affected buds that have been shown to behave in this manner, the innoculation tests were carried out on local lime seedlings which are similar to key limes, the plants which were found to be indicator plants by Wallace and Drake (12) and were subsequently used by a number of workers to test the presence of tristeza virus in samples.

Some workers like Giacometti and Soorey (5) have studied the local indicator plants and have concluded the presence of tristeza on the basis of stem pitting found in the locally growing plants. In the present study, the vein clearing and stem pitting was found to develop on acid lime seedlings and the acid lime plants budded on 'Jamburi' were found to show pronounced stem pitting on the scion portion of the stem.

It may, however, be mentioned that the vein clearing and stem pitting on indicator plants was found to develop irrespective of the fact whether the material for inoculation was taken from 'Dieback' affected plants or healthy plants.

Tristeza Present

The above would show that not only is tristeza virus present in Bombay, but it appears probable that almost all trees in the State are symptomless carriers as pointed out by Fawcett and Wallace (3). A rootstock experiment with five different rootstocks has been in progress at Poona for the last 14 years and it was decided to study the pitting symptoms on the stock and scion portion of the plants.

Accordingly a part of the stem at the point of the bud union was exposed so as to show both stock and scion in case of all the stonic combination. It was noticed that some of the plants on 'Jamburi' rootstock showed a yellowish discoloration of the bark along with a few rounded pits, with some constriction at the bud union.

The plants on Rangpur lime rootstock did not show any abnormality either on the rootstock or scion, but those on 'karna', sweet lime and 'galgal' rootstocks showed a complete absence of any stem pitting on the scion portion but had well developed stem pitting symptoms on the rootstock portion.

'Karna' is a rootstock variety which has been found to do well for local variety of sweet orange and grapefruit in the Punjab, but has been a failure for Bloodred variety of sweet orange. This rootstock is believed to be a natural hybrid between sour orange and rough lemon by Singh (10).

'Galgal' is the hill lemon of Northern India and has never been used as a rootstock earlier. Sweet lime is the same rootstock which is commonly used in Israel. The development of stem pitting on 'karna' and 'galgal' rootstock may be due to tristeza, but that on sweet lime suggests the presence of Xyloporosis virus in the same manner as tristeza in most trees which

appear to be its symptomless carriers.

Thus it will be seen that the two important virus diseases of tristeza and Xyloporosis are present in citrus gardens of Bombay state. The studies of various citrus gardens show that 10-20% of the trees are suffering from Psorosis and as no care is taken in exclusion of such trees at the time of taking budwood for further propogation, the disease is spreading rather rapidly.

The symptoms are noticed on the scion portion only and may appear on the main stem or one or more of the limbs. In the former case the whole tree shows symptoms of decline while in the latter case it is only the affected limb that shows the symptoms. The affected portions show irregular dry scales of bark. The scaling is usually not accompanied by gummosis.

The clearing of vein and adjacent tissues in case of young leaves is also noticed in case of trees which are showing scaling of bark as well as in case of these trees which have not yet started showing pronounced scaling of bark. These leaf symptoms usually fade out when the leaf has hardened and is fully grown. The symptoms of Psorosis B are also sometimes noticed, but the % of trees affected by this type of Psorosis is rather small.

Introduced From South Africa

It is well known that tristeza has been present in South Africa since last century and was introduced into American hemisphere from that country. It would appear that the disease in India has also been introduced from that area. The success of sour orange as a rootstock in northern India in the early years and also the success of acid lime as a rootstock for sweet orange in Kodur reported by Naik (9) may tend to suggest that the tristeza disease is perhaps localized in Bombay state where mosambi variety imported from South Africa is grown.

However the presence or absence of this disease in other parts of India will require testing.

Rough Lemon Not Affected

Most of the workers on tristeza disease have found that rough lemon is not affected by tristeza though other lemon types are known to be affected by this virus, Gandhi (4) is firmly of the belief that 'Jamburi' used as a rootstock in Bombay state is the same as rough lemon used in U. S. A., but Singh (10) is of the opinion that 'Jamburi' of Bombay state is a little different from typical rough lemon.

It is found that when both rough lemon and 'Jamburi' are grown at the same place, the only difference noticed between the two is the comparatively loose skin of Jamburi as compared to that of rough lemon. It appears that Bombay rough lemon may not be exactly the same as rough lemon used in U. S. A. but is quite similar to it. It has also been pointed out by Grant et al (6) that in the rootstock tests in Bahia, individual trees on rough lemon rootstocks were found to show tristeza symptoms. Levitt (8) has pointed out that both sweet orange and mandarin trees in Australia suffer from a virus disease which affects trees propogated on rough lemon rootstock.

It is, however, a point worth mentioning that this disease affecting trees on rough lemon is found in areas where tristeza is also found.

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Crop Condition And Outlook Report

Fruit sizing and maturity remain a major problem of the 1958-59 Florida citrus crop, Robert W. Rutledge, Florida Citrus Mutual general manager, said recently in his current crop condition and outlook report.

The report, compiled by Mutual's field representatives, covers 13 counties and the Indian River area. Rutledge said it is a "representative sampling and is not all inclusive".

Scale and rust mite is causing some concern to growers in several areas, Rutledge said.

Excerpts from the report by counties:

Hardee—Inadequate moisture has some growers thinking of irrigating. Fruit sizes are generally small, and that, along with high acid, is holding back movement.

Manatee and Sarasota—Fruit sizes and color are picking up, but splitting and scale infestation are causing some loss of fruit. So far, there has been little movement.

Highlands—Dry weather prevails, and numerous growers are on a full irrigating schedule. Sizes and maturity of early oranges and grapefruit are causing some concern, but overall color of fruit is good.

Desoto — Orange and grapefruit coloring is very good, although maturity on oranges remain slow. Orange sizes are practically normal since this area had fair rainfall during the growing season.

Polk—Cool nights have evened out coloring of oranges and grapefruit. Hope for fruit sizing has been abandoned, except for Valencias. Hamlins and Duncan grapefruit take the lead in small sizes.

Indian River—Late coloring, late maturity and small sizes are causing movement to be light. Some growers are irrigating to build up size of fruit.

Hillsborough—Sizing not a major problem. Better sizes are expected in mid-season oranges and Marsh grapefruit.

Orange, Osceola and Seminole—Most varieties are showing some size increase, but droppage is causing concern since it is taking place in scale and non-scale infested groves.

Lake—Color break is good on tangerines, early oranges and grapefruit. Crops are picking short of their estimates because of small size and lack of inside fruit.

Marion—Small size and late maturity continue to hold crops back. Heavy rust mite and melanose are causing damage in some groves.

Volusia and Putnam—Fruit movement is picking up but small sizes and late maturity are holding crops back. Recent warm spell retarded coloring of tangerines in some areas.

About 6½ million boxes of oranges went into chilled juice and sections during the 1957-58 citrus season.

"RAINBOW improves my yields and quality"

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5-58

SOIL APPLICATION OF ZINC FOR CITRUS ON ACID SANDY SOIL

(Continued from page 7)

were applied in piles. Broadcast applications of all inorganic zinc mixtures gave little if any increase over zinc sulfate applied alone.

On December 11, 1957, both leaves and ripe fruit were sampled from trees treated with five pounds zinc sulfate and five pounds calcium chloride applied in 60 piles, and from untreated check trees. The whole fruit was analyzed for zinc, as were the seeds, pulp, and peel. All samples taken from the treated trees were appreciably higher in zinc than those from the check trees (Table 3). The zinc content of the fruit was much lower than that of the spring flush leaves.

(b) Zinc Chelate Treatments. — Soil pH measurements made within the zone of application of a mixture of zinc chelate and five pounds soda ash applied in piles in 1956 showed that the pH was not sufficiently high to keep the zinc in available form. In 1957, therefore, the application of soda ash was increased to either 10 or 15 pounds per tree with enough zinc chelate (ZnEDTA or ZnEDTA-OH) to supply either 100 or 328 grams of zinc. The data in Table 4 show that some of these treatments gave even higher zinc levels in the leaves than five pounds each of zinc sulfate and calcium chloride applied in piles. Application in 10 holes, 10 inches deep resulted in much lower leaf zinc than application in 10 piles on the soil surface, possibly because application in holes by-passed the zone of greatest root concentration. The fact that the zinc chelates were applied in July probably explains the relatively high zinc levels in the new fall flush leaves from certain treatments. Similar high zinc levels in fall flush leaves were obtained with July applications of zinc sulfate and calcium chloride in piles. ZnEDTA applied alone in 10 piles at the rate of 100 grams of zinc per tree gave no increase in uptake of zinc over the untreated checks.

Data in Table 4 also show that 328 grams of zinc in chelated form combined with five pounds of zinc sulfate gave relatively high levels of zinc in the leaves. When 328 grams of zinc as ZnEDTA was applied in piles with five pounds of calcium chloride, the zinc content of the leaves was about the same as from similar applications of two pounds of zinc sulfate (328 grams Zn) with five pounds of calcium chloride.

3. 1958 Treatments.—Preliminary results from 1958 treatments, based on one date of sampling, showed that application of five pounds each of zinc sulfate and calcium chloride in five piles of one square foot each gave zinc levels of more than 300 ppm in the spring flush. Zinc contents from the same mixture applied in 10 similar piles were 100 to 150 ppm lower. Both methods were very effective on orange trees on Rough lemon rootstock growing in Lakeland fine sand. Three pounds each of zinc sulfate and calcium chloride applied in five piles also gave more than 300 ppm zinc. As little as 50 grams of zinc as ZnEDTA with five pounds of soda ash applied in five piles gave zinc levels of about 100 ppm in the spring flush leaves.

EXPERIMENTS ON BLANTON SAND

In order to determine whether the effectiveness of zinc soil treatments varied with soil type, an experiment was started in 1958 in a grove of Valencia orange trees on grapefruit rootstock growing on a Blanton sand near Wauchula. This soil contains more clay and organic matter than the Lakeland soil. Many trees in this grove showed pronounced symptoms of zinc deficiency or frenching. Frenched leaves contained 11 ppm zinc, and green leaves from trees showing some frenching contained only 16 to 18 ppm zinc.

Soil application of five pounds zinc sulfate with five pounds calcium chloride in five piles resulted in a zinc content of 213 ppm in spring flush leaves sampled three and one-half months after treatment. Application of five pounds zinc sulfate alone in five piles gave only 22 ppm zinc. The zinc sulfate—calcium chloride treatment greened the chlorotic leaves, whereas the zinc sulfate alone failed to do so. Zinc oxide applied in five piles in an amount equivalent to five pounds zinc sulfate failed to increase the zinc in spring flush leaves both when applied alone and when applied with five pounds calcium chloride.

ZnEDTA at rates varying from 30 to 300 grams of zinc per tree was mixed with soda ash and applied in either 5 or 10 piles per tree. When 300 grams of zinc per tree was applied with five pounds of soda ash in five piles the spring flush leaves contained 65 ppm zinc three and one-half months after treatment. This treatment also greened up the frenched leaves. Applications of 100 grams of zinc or less in chelated form in combination with soda ash were relatively ineffective. Experiments are being continued on this soil.

DISCUSSION

The mixture of five pounds each of zinc sulfate and calcium chloride applied in five piles was the most effective zinc soil treatment. It should be emphasized that soil applications of the zinc sulfate—calcium chloride and the zinc chelate—soda ash mixtures have substantially increased the zinc in the trees only when applied in high concentration over small localized areas under the trees. Even band application was effective only when the bands were relatively short and one foot or less in width. Uptake of zinc by Valencia orange trees on grapefruit rootstock on the Blanton sand was somewhat lower than that by Pineapple oranges on Rough lemon rootstock, growing on Lakeland sand. It is believed that this reduction in uptake of zinc from the Blanton sand is due to the higher zinc-fixing capacity of the soil, but the difference in rootstock may be partly responsible.

It was previously believed (9) that the effectiveness of calcium chloride in greatly increasing the uptake of zinc from zinc sulfate was due to the saturation of the soil exchange complex with calcium ions, thus preventing the retention of zinc near the soil surface and permitting it to move down into the root zone. It appears now that the calcium ion can be credited with only part of the effect because calcium nitrate, which also supplies abundant calcium ions, proved to be far less effective than calcium chloride. Similarly, the chloride ion can be given only limited credit, since zinc chloride showed little advantage over zinc sulfate as a source of zinc for soil application. In any event, it seems clear that calcium chloride in high concentration is an effective agent for increasing uptake of zinc by the trees from various zinc sources.

Failure of zinc chelates to increase the zinc in the leaves when applied alone to the soil is due to replacement of the chelated zinc by iron in the soil, resulting in formation of the far more stable iron chelate. This replacement reaction has been demonstrated in the laboratory (13) and in the field by the correction of iron chlorosis in orange trees growing on acid sandy soil by application of ZnEDTA (11).

Laboratory tests showed that che-

lated zinc remains soluble in water even at a pH of 10.0 or 11.0, whereas inorganic iron is rapidly precipitated. Hence, when the soil reaction in the treated area is raised to pH 9.0 to 10.0 with soda ash, much of the soil iron is precipitated so that it cannot react with the zinc chelate. At the same time the zinc chelate remains soluble and available to the tree roots. Precipitation of the soil iron at a high pH is the only method found to date to make zinc chelates useful sources of zinc for citrus in Florida.

It is interesting to note that even though both zinc sulfate and zinc chelates are ineffective when applied separately to the soil, mixtures of 328 grams of zinc in chelated form with five pounds of zinc sulfate gave high zinc levels in the leaves. This combination appears to be effective only with relatively high amounts of chelated zinc, since 100 grams of chelated zinc with five pounds zinc sulfate gave much lower zinc levels in the leaves than 328 grams of zinc.

The zineb spray residue in the Pineapple orange grove caused an increase of about 100 ppm zinc on unwashed spring and summer flush leaves. Leaf samples carefully washed in a solution of five percent HC1 and Dreft showed an apparent increase of 10 to 15 ppm zinc over leaves sampled in 1956 from similar untreated trees in the same grove. The 1957 fall flush leaves, which developed after the zineb spray was applied, showed zinc levels comparable to fall flush leaves taken late in 1956.

Soil application of zinc by the methods reported here may be feasible on limited areas of zinc-deficient groves which are not sprayed.

General use of zinc soil application in place of zinc sprays is not recommended at this time because soil application will cost more in both labor and material. This disadvantage may be offset to some extent by the greater longevity of the soil treatments. It is believed that real progress has been made on this problem since previously there was no known method of zinc application—either to the soil or in a spray —which could raise the zinc content of citrus trees to a high level. More work needs to be done to establish optimum levels of zinc in citrus leaves.

All results reported here were obtained from soil treatments on acid soils. Similar work is in progress with citrus trees growing on alkaline calcareous soils.

SUMMARY

Several different zinc sources were applied alone and in combination with one or more other materials to the soil around orange trees growing on acid sandy soil. Methods of application were as follows: (1) broadcast, (2) spot application in either 5 or 10 square-foot piles per tree, (3) 60 smaller piles per tree, (4) application in 10 holes of one square-foot cross section and 10 inches deep, and (5) application in narrow bands. Zinc sources used included zinc sulfate monohydrate (36 percent zinc), zinc chloride, zinc nitrate, zinc oxide, and two zinc chelates.

All zinc sources applied alone proved to be ineffective in substantially increasing zinc uptake by the trees regardless of method of application, although increases of 10 to 20 ppm zinc in the leaves were obtained in a few cases with 5 or 10 pounds of zinc sulfate per tree. A mixture of five pounds each of zinc sulfate and calcium chloride applied to Lakeland sand in 10 piles each of one square-foot area or 60 smaller piles increased the leaf zinc to levels varying from 115 to 219 ppm, as compared with 47 ppm in the untreated check trees. Preliminary results from application of this mixture in five piles per tree in 1958 resulted in leaf zinc levels higher than 300 ppm.

A mixture of zinc chelate with soda ash applied in piles or in a narrow band in sufficient amounts to raise the soil pH to about 10.0 in the treated areas also resulted in very high concentration of zinc in leaves. All broadcast applications of zinc sources were ineffective.

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CITRUS INSECT CONTROL FOR JANUARY 1959

(Continued from page 3)

cool weather mites prefer the tops and southeast sides of the trees. As with scale, keep the mite populations down to a low level so it will not be necessary to spray while the growth is tender. Regardless of the miticide used, treat before 20 percent of the leaves are infested and make a thorough application.

There is a choice of miticides that can be used. The degree of infestation, the effectiveness of the material, its compatibility with other materials and cost are factors to be considered when selecting the miticides.

Tedion at 1/2 pound per 100 gallons is very effective. Since there has been no residue tolerance established, it can be sprayed only on nonbearing trees and bearing trees that have no fruit on them. Tedion is slow to kill mites and if there is a heavy infestation at the time of application the active mites can be killed by adding parathion, malathion, TEPP, or Cholorobenzilate. If either parathion or malathion is used it is advisable to use enough so that it also will control scale. Chlorobenzilate will also control rust mite. Tedion is compatible with other spray materials.

Trithion at 1 pound of the wettable powder or 1/2 pint of liquid per 100 gallons kills the active mites and has good residual action. It is also as effective as sulfur for rust mite control. It is compatible with other materials used in citrus sprays. There is a waiting period of 14 days between application and harvest.

Kelthane at 1 to 1.5 pints per 100 gallons kills the active mites, but it has not given as long a period of control as Tedion and Trithion. It should not be used in alkaline solutions, but is believed to be compatible with other non-alkaline materials. The waiting period is 7 days between application and harvest.

Systox at 1/2 to 1 pint per 100 gallons is effective and results in a quick kill of mites. It should not be mixed with alkaline materials. It can be applied on oranges, lemons, and limes up to 21 days before harvest.

DN Dry Mix No. 1 at 2/3 pound per 100 gallons is most effective when applied to light infestations and when eggs are not numerous. It should not be used in highly alkaline solutions. A mixture of DN and parathion sometimes causes a leaf drop. It may cause increased injury on fruit on Hamlin and Pineapple oranges when there is a peel breakdown. A 1.5 percent DN-sulfur dust is fairly effective on light populations if a thorough application is made. No injury has been observed following a DN dust, but no form of DN should be applied on succulent foliage. There is a waiting period of 12 days between application and harvest.

Six-Spotted Mite Control: There are no indications that the six-spotted mite will be a problem next spring, but in checking groves take into account this mite. Inspect the under surfaces of leaves on lemon sprouts and around colonies of purple scale, especially on grapefruit trees. Usually the six-spotted mite is not a problem in groves sprayed in January for purple mite control.

Rust Mite Control: The rust mite should be controlled even though the crop has been picked. A heavy infestation on leaves can cause as severe a leaf drop as purple mites. Inspect the leaves as well as fruit because mite infestations are often heavier on leaves than fruit in cool weather and they are difficult to see after the fruit has colored.

Zineb at 1/2 pound per 100 gallons is the most effective material for rust mite control, but a thorough application should be made because it has no fumigation effect. It can be mixed with other spray materials, but DN has not been as effective when mixed with zineb as with sulfur or Chlorobenzilate.

Chlorobenzilate at 1/2 pound per 100 gallons is slightly more effective than sulfur. It should not be mixed in alkaline solutions.

Trithion at 1 pound wettable or 1/2 pint liquid per 100 gallons is effective for rust mite control and will also control the purple and Texas citrus mites. It can be mixed with most other materials used on citrus. There is a waiting period of 14 days between application and harvest.

Wettable sulfur at 10 pounds or 1 gallon of lime-sulfur plus 5 pounds of wettable sulfur per 100 gallons is effective. A thorough application of sulfur dust on light infestations is fairly effective. Lime-sulfur should not be applied to trees with mature Hamlin or Jaffa oranges or tangerines.

Scab Control: Scab control is important on Temples, tangelos, lemons and on grapefruit grown in the coastal areas. Apply the fungicide just before growth starts or on pin point growth. Use a copper compound at .75 pound of metallic copper per 100 gallons or if scab is severe double that amount. Neutral coppers are compatible with other materials except lime-sulfur.

Nutritional Sprays: Zinc and manganese compounds can be applied either as a dormant or post-bloom spray. It is advisable to apply these compounds as a dormant spray where copper-oil is expected to be used in the spring. Where more than one metal compound is mixed with an oil there is danger of marking fruit as well as breaking the emulsion.

Details of spray schedules and the various materials used will be found in the "Better Fruit Program" and this should be consulted to determine which materials may or may not be combined. For further information, consult the Citrus Experiment Station at Lake Alfred or Fort Pierce.

SOIL APPLICATION OF ZINC FOR CITRUS ON ACID SANDY SOIL

(Continued from preceding page)

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(Continued on page 22)

Reports Of Our Field Men . . .

HILLSBOROUGH PASCO AND SUMTER COUNTIES

C. W. Dean
Gibsonton, Fla.
Phone Tampa 40-2592

We are having some weather which is very much to my disliking at this time. However, I am hoping that it doesn't get cold and do the damage as last year.

Fruit is moving regularly now. Prices seem to be very good. We still have some groves that are infested with Texas citrus mites and some purple mites. Again I would like to say that it is very important to spray for these mites as they can be very harmful to the tree. If the infestation gets very heavy on the leaves, they will cause the leaves to fall and in most cases the limb will die; therefore causing a reduction of bloom for the next year.

Most of our growers have either applied or will apply in the next two or three weeks their application of fertilizer.

By the time you read this, it will have been too late to wish you a Merry Christmas, but I wish each and every one of you a very prosperous New Year. I believe that those of you that haven't tried Lyons fertilizer, set aside a tract of your land and try it. You will prosper from it.

SOUTH POLK, HIGHLANDS, HARDEE AND DeSOTO COUNTIES

C. R. Wingfield
Phone: Glandale 2-8181
Avon Park, Fla.

At the time of this article we are having threats of some cold weather but so far we have had no damaging colds. We have had some rains that has been helpful and the winds and overcast has kept us from a killing frost. From reports South Florida has been having more rains than this section.

The citrus grower has just about finished his fertilizer applications and with the weather threats has been busy banking young trees. Much of this was delayed due to the several weeks of warm weather, Some have found it necessary, where they banked early, to pull down the south side of the tree.

The watermelon grower has begun to get his planting operation under way and the vegetable grower is also making his plans for his spring crop. We are unable to determine at this time what the acreage of either will be.

Citrus fruits are moving into the market channels at a rapid rate. Most of the crops are sold except Valencias.

NORTH CENTRAL FLORIDA

V. E. Bourland
Winter Garden, Fla.
Phone 107

We have had some wonderful weather with a few showers about as needed. All groves are looking good, and worked up better than they have been in a number of years. Fruit is coloring up, and being picked rapidly, seems that most of them are picking out less fruit than was estimated. Most all young trees have been banked, and cover crops worked in the soil. Pastures are holding up well, and cattle are in good shape. Melon growers are preparing their fields for planting.

SOUTH HILLSBOROUGH, MANATEE AND SARASOTA COUNTIES

Eaves Allison
P. O. Box 365, Sarasota, Fla.
Phone Fulton 8-2611

The bluebird days of November and so far through December 9th have not been very conducive to coloring up citrus. Also these balmy days have sort of created a field day for the mite populations.

Fall vegetables have been somewhat disappointing, with tomatoes running small and with prices too low to be profitable most of the time. Some few very early crops did enjoy fair prices. Squash, eggplant, cabbage, and beans have not made anyone rich but more than the cost of production.

Pastures are still green as we have had no frost as yet to singe the grass. However, cooler weather is forecast so we shall see what we shall see.

WEST HILLSBOROUGH AND WEST PASCO COUNTIES

J. A. Hoffman, Lutz, Fla.
Phone WE 9-2069

The past few weeks growers have been busy marketing their crops. Most crops have been short of production. The prices very good and the demand for fruit heavy.

The cool weather early in December has helped to color and and sweeten fruit. Moisture conditions have been very good thus far.

Red spider and rust mite are quite active at this time. A close watch should be kept and a spray applied when necessary.

Most growers are already talking about applying a top dresser early in February. Some will get started the last of January.

Melon growers are busy breaking ground, laying off rows and preparing to start putting out fertilizer by the end of December.

HIGHLANDS AND POLK COUNTIES

R. E. Lassiter, Jr.,
P. O. Box 1304
Winter Haven, Fla.

From the first of December up until the time of this writing we have received enough rainfall to put the citrus groves in good condition moisture-wise at this time.

Growers have completed their fall fertilizer application in this area and are finishing up their preparations for the colder weather. There is still quite a bit of spraying being done to control scale populations which have built up to the dangerous point this fall.

Growers should be checking their groves frequently for rust mite as well as purple mite and Texas citrus mite at this time.

We would like to take this opportunity to wish everyone a . . . MERRY CHRISTMAS and HAPPY NEW YEAR!

Uncle Bill Says:

At this season of the year most everyone has sort of a mellow feelin' toward his fellowman . . . and a heap of folks seem to add complete sincerity in their New Year's Greetings . . . all of which is right and proper, cause when there no longer is any good will left anywhere in this world we will have come to a mighty sorry pass.

Matter of fact after what happened to our industry a year ago in December we shore have got a lot to be thankful fer, at the present time . . . course to the fellow who lost all his crops last year and most of his young trees there ain't much consolation . . . but thank the good Lord the percentage of such growers was not nearly as great as it might have been.

So this year the job of sellin' our fruit at fair prices ain't nearly the chore it has been in a lot of years past. Us folks who suffered the least damage should be grateful fer our good luck, and we should feel mighty compassionate towards those whose luck wasn't as good as ours.

However, the history of the citrus industry in Florida has recorded a lot of disasters which us growers has gone through from time to time and there ain't never been a time when this industry, and the growers who make up the industry has been licked. We're already makin' great strides towards gitting completely well again, so we may very properly say to ourselves that the citrus business is a good business . . . and be glad we're in it.

And we want to tell you all . . . that we wish you the very nicest Christmas and the Happiest New Year you've ever had.

SOIL APPLICATION OF ZINC FOR CITRUS ON ACID SANDY SOIL

(Continued from page 19)

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GUIDE TO CITRUS INSECTS, DISEASES AND DISORDERS

The Agricultural Experiment Station's new Florida Guide to Citrus Insects, Diseases and Nutritional Disorders in Color, delivered from the printer in December, is already attracting widespread attention throughout citrus growing areas of the world. It is said to have no equal in its field.

With 96 pages of four-color plates and 100 pages of text, it pictures and describes practically every known citrus trouble, including those caused by insects, diseases, nutritional disorders and mechanical injury. The illustrations and descriptions are so clear that almost anyone can take an actual specimen and compare it with the illustrations and make positive identification of his trouble. The book does not discuss control measures, which change from time to time as new materials are found more effective than older ones. The book recommends that the grower consult the State Citrus Commission's Better Fruit Program for currently recommended control measures.

The illustrations and text were prepared by Dr. R. M. Pratt and other members of the Citrus Experiment Station staff, including Drs. H. J. Reitz, C. D. Leonard, Ivan Stewart, E. J. Deszyck, E. P. DuCharme, R. F. Suit, W. C. Price, L. C. Knorr, W. Grierson, W. F. Newhall, I. W. Wander, and J. J. McBride.

It discusses mites, mealybugs, unarmored and armored scales, miscellaneous insects, nutritional disorders, decline diseases, miscellaneous diseases, fruit rots and blemishes, miscellaneous injuries, spray and dust injuries, superficial coatings, and some important insects and diseases not known to occur in Florida.

E. Meade Wilson Receives 25-Year Service Pin From International....

E. Meade Wilson, manager of International Minerals & Chemical Corporation's plant food operations in Florida and Southern Alabama,

E. MEADE WILSON

has been awarded a special service pin upon completion of 25 years with the company. The presentation was made by John Zigler, general manager of IMC's plant food division, during a meeting at the Skokie, Ill., home office of all area managers.

Wilson, whose offices are at Mulberry, Fla., joined International on August 1, 1933 as a field representative working on the Florida east coast. He served later as field manager and district sales manager. He has been an area manager since 1952.

In addition to sales responsibility in his area, Wilson supervises the International fertilizer plants at Pensacola, Jacksonville and Mulberry.

Prior to joining IMC, Wilson had operated a feed brokerage business in Lakeland and earlier had been sales manager for Jacksonville and Coral Gables automobile and real estate companies.

A native of Pensacola, the IMC plant food veteran attended Alabama Polytechnic Institute after being graduated from high school at Lake City. He entered the Navy from Auburn during World War I and has been active in veterans organizations, being a national executive committeeman and past state commander of the American Legion. He has also held office in the Florida State Chamber of Commerce, Kiwanis and the Florida Agricultural Research Institute. Wilson is a member of numerous other civic, fraternal and social organizations.

Taylor 4-H Electric Clubs

Perry, Fla.—The Taylor County 4-H electric club was organized recently at a meeting attended by 100 people, including 20 parents. Through it both boys and girls will learn about electricity and electrical equipment, under the leadership of Henry P. Davis and Miss Ethel M. Paschall, county and home demonstration agents.

A. M. Pettis, associate agricultural engineer with the University of Florida Agricultural Extension Service, said attendance at the Taylor meeting was the highest of any county that has organized to date.

Twelve dads agreed to be adult leaders and assist 4-H boys and girls with their electricity projects.

Stress Family Life

Home demonstration clubs in Duval County plan to emphasize family life discussions in the monthly meetings in 1959, it is reported by Mrs. Nellie D. Mills, home agent. Miss Ruth Harris, family life specialist with the Agriculutral Extension Service in Tallahassee, recently met with club leaders and helped lay plans for the emphasis.

The season's average delivered price paid for oranges for frozen orange concentrate in 1957-58 was $2.55 per box.

57,150,566 gallons of frozen orange concentrate was packed in 1957-58 citrus season.

Classified Ads